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EXAMINER

STOUFFER, KELLY M

ART UNIT PAPER NUMBER

1762

DATE MAILED: 12/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/771,331

Applicant(s)

MASSLER ET AL.

Examiner

Kelly Stouffer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 November 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 43-76 is/are pending in the application.
- 4a) Of the above claim(s) 62-76 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 43-52, 55 and 58-61 is/are rejected.
- 7) ☒ Claim(s) 53, 54, 56 and 57 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 July 2004 and 05 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/551,883.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 2/5/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 43-61 in the reply filed on 13 November 2006 is acknowledged.

Claims 62-76 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on 13 November 2006.

Priority

2. This application appears to be a division of Application No. 09/551883, now US Patent number 6740393, filed 18 April 2000. A later application for a distinct or independent invention, carved out of a pending application and disclosing and claiming only subject matter disclosed in an earlier or parent application is known as a divisional application or "division." The divisional application should set forth the portion of the earlier disclosure that is germane to the invention as claimed in the divisional application.

Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). The certified copy has been filed in parent Application No. 09/551883, now US Patent number 6740393, filed on 18 April 2000.

Drawings

3. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: magnetic systems 20 and magnetron magnetic system 22 (page 29). Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities:

On page 8 line 10 "a" should be —as—

On page 15 line 24 "an" should be —and—

Reference number 23 in Figure 2 is not defined in the specification.

Appropriate correction is required.

Claim Objections

5. Claims 53, 54 and 56-57 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

Claims 54 and 56-57 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependant claim. See MPEP § 608.01(n). Accordingly, the claims have not been further treated on the merits.

6. Claims 58 and 59 are objected to because of the following informalities: Claim 58 depends from claim 1, which was cancelled. For the purposes of examination, claim 58 will be taken to be dependant upon claim 43, but it is uncertain when in the process of claim 43 this substrate bias is to be applied. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 43-52, 55, and 58-61 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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Regarding claim 43, the phrase "and the like" renders the claim(s) indefinite because the claim(s) include(s) elements not actually disclosed (those encompassed by "and the like"), thereby rendering the scope of the claim(s) unascertainable. See MPEP § 2173.05(d).

Claim 43 recites the limitation "the simultaneous plasma-aided vapor depositing of the adhesion layer constituents" in lines 11 and 12. There is insufficient antecedent basis for the limitations of both "the simultaneous plasma-aided vapor depositing" and "the adhesion layer constituents" in the claim.

Claim 51 is indefinite because it is uncertain what is being claimed as the claim recites choices of various bias voltages without having them in the alternative.

Claims 44-50, 52, 55, and 58-61 are rejected as being dependant upon a rejected base claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

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2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. Claims 43-44, 49, 52, 55 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent number 5645900 to Ong et al. in view of US Patent number 6558471 to Neerinck et al.

Regarding claim 43 Ong et al. includes a process for producing a layer system for the protection against wear and corrosion and improving the sliding properties (column 1 et seq. and column 2 lines 1-19 and column 5 lines 25-28) having an adhesive layer on the substrate, a transition layer for the arrangement on the adhesive layer and a cover layer of diamond-like (adamantine) carbon (see Figures 1 and 2 and column 3 lines 48-66). The process comprises charging the substrate into a vacuum chamber and pumping down to a vacuum of a pressure of less than 10^{-4} mbar or 5.7×10^{-5} torr (column 6 lines 15-35), plasma-aided vapor depositing of the adhesive

layer on the substrate (Figure 4), applying the transition layer to the adhesion layer by the simultaneous plasma-aided vapor depositing of the adhesion layer constituents and depositing carbon from the gas phase (Figure 4 and columns 2 and 3 lines 20-8), applying the adamantane carbon layer on the transition layer by a plasma-aided depositing of carbon from the gas phase (Figure 4 and column 6 lines 44-52), applying a bias voltage to the substrate, and a magnetic field to the plasma to stabilize it (reduces heating effects caused by electrons and neutralizes charges in the plasma, see columns 5 and 6 lines 60-57). Ong et al. does not include cleaning the substrate before depositing the adhesive layer. Neerinck et al. teaches a reactive ion-etching step before depositing similar layers to activate the substrate surface and remove residual oxides (column 5 lines 30-35).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ong et al. to include a cleaning step before deposition as taught by Neerinck et al. in order to activate the substrate surface and remove residual oxides.

Regarding claim 44, the cleaning of Neerinck et al. includes ion-etching (column 5 lines 30-35).

Regarding claim 49, deposition of the adhesive layer takes place by plasma CVD process (column 2 of Ong et al. lines 45-49).

Regarding claim 52, Neerinck et al. discloses using argon with a precursor to ignite the plasma (column 2 lines 58-67).

Regarding claim 55, Neerinck et al. discloses using carbon-containing gas to deposit carbon from the gas phase in plasma aided CVD (column 3 lines 17-25).

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Regarding claim 61, Ong et al. discloses pressures in the claimed range in column 6 lines 15-35.

9. Claims 45-46 and 60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ong et al. in view of Neerinck et al. as applied above, and further in view of US Patent number 6332947 to Ichimura et al.

Ong et al. and Neerinck et al. include the provisions of claims 45 and 46 except for heating the substrate by electron bombardment that takes place using a low-voltage arc and the simultaneous application of an AC bias voltage to the substrate. Ichimura et al. teaches using an AC superimposed bias voltage on the substrate during plasma deposition that would cause electron bombardment during coating, etching etc. in column 5 lines 55-65 (where one of ordinary skill in the art would recognize that during etching or sputtering a substrate using plasma one would clean the surface of the substrate and raise its temperature) in order to have a good substrate anisotropy (column 9 lines 57-67) and increase process efficiency (column 4 lines 41-58).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ong et al. and Neerinck et al. to heat the substrate by electron bombardment that takes place using a low-voltage arc and the simultaneous application of an AC bias voltage to the substrate as taught by Ichimura et al. in order to have a good substrate anisotropy and increase process efficiency.

With regard to claim 60, Ichimura et al. discloses the longitudinal magnetic field used during deposition that varies with respect to space (abstract).

10. Claims 47-48 and 50-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ong et al., Neerinck et al. and Ichimura et al. as applied above, and further in view of US Patent number 5431963 to Rzaad et al.

Ong et al., Neerinck et al. and Ichimura et al. are described above and include the provisions of claims 47-48 except for using Ar and He as the plasma gas during etching and a negative substrate bias voltage during etching and deposition of a film. Rzaad et al. teaches using Ar and/or He depending on the substrate used (column 2 lines 62-66) to improve film adhesion on the substrate and receive varied desired effects in the future film (column 5 lines 30-45).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ong et al., Neerinck et al. and Ichimura et al. to include using Ar and He as the plasma gas during etching and a negative substrate bias voltage during etching and deposition of a film as taught by Rzaad et al. in order to improve film adhesion on the substrate and receive varied desired effects in the future film.

11. Claims 58-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ong et al. in view of Neerinck et al. as applied above, and further in view of US Patent number 5779925 to Hashimoto et al.

Ong et al. and Neerinck et al. include the provisions of claims 58-59 except a sinusoidal substrate bias voltage in the medium frequency range of 10-10000 kHz. Hashimoto et al. teaches applying a sinusoidal substrate bias voltage in the claimed

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frequency range in order to reduce damage to the film or the substrate during plasma processing (column 13 lines 8-48).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Ong et al. in view of Neerinck et al. to include a sinusoidal substrate bias voltage in the medium frequency range of 10-10000 kHz as taught by Hashimoto et al. in order to reduce damage to the film or the substrate during plasma processing.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kelly Stouffer whose telephone number is (571) 272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Kelly Stouffer
Examiner
Art Unit 1762

kms



TIMOTHY MEEKS
SUPERVISORY PATENT EXAMINER